Aviation Management Plan
Wyoming State Forestry Division
2015

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Prepared by: Les Koch Date: 8-4-15

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Wyoming State Forestry Division

Reviewed by: _____ Date: _____

US Forest Service
Aerial Survey Program Manager, Region 2

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State Forester
Wyoming State Forestry Division

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I. Background

Safety: Safety is the top priority for Wyoming State Forestry Division's (WSFD) Aerial Detection Survey Program. Safety awareness is a mental attitude and individual commitment fostered by proper management and supervisory procedures. WSFD management must be a partner in aviation safety to ensure that the standards and procedures established are understood and followed. Procedures and practices are meant to prevent aviation mishaps from occurring and to support WSFD's institutional concern for safety.

Aviation safety cannot be legislated or mandated; it can only be successfully accomplished by fostering and inspiring an attitude in which safety is the foremost priority. An undeviating and persistent commitment to professional conduct by everyone involved in the aviation program is paramount to achieving mishap prevention and successful risk management.

All WSFD personnel involved in the aviation program play a role in the successful and safe outcome of aviation activities. However, management is responsible for achieving safety goals. This can only be accomplished through awareness and uncompromising support by management.

Definition of Aerial Surveys: WSFD uses aerial detection surveys as an economical and efficient method of detecting, monitoring, and evaluating recognizable insect, disease, and other disturbances to forest ecosystems. The purpose is to observe forest change events from an airplane and document them manually onto a Dell LATITUDE XT2 laptop computer or a paper USGS 30X60 1:100000 scale topographic map. The observer views a particular forest change event and delineates the affected area onto a map to record its size, shape, and location as accurately as possible. Attributes such as host, causal agent, symptom, and an estimate of intensity (number of trees or number of acres or percentage of trees affected in the polygon) are recorded.

A high-winged aircraft providing good visibility and capable of flying at relatively slow speeds, a pilot who has a sincere interest in safety and is experienced flying mountainous terrain, and an observer who has the ability to relate forest damage observed on the ground to features on a map without experiencing the debilitating effects of motion sickness are needed for a successful survey. Aerial observers need the ability to ride in an aircraft for three to six hours a day, a desire to participate in aerial survey activities, have an interest in aviation, good eyesight with normal color vision and depth perception, a background in forestry and the ability to identify tree species in the survey area, a working knowledge of forest insects and diseases, and the ability to understand a map and coordinate aircraft location with the corresponding map location.

History: WSFD participates in National Forest Health Monitoring (FHM) to annually monitor, assess, and report on conditions and trends of the nation's forested ecosystems. This is done in partnership with the USDA Forest Service, State Foresters, Bureau of Land Management, and other federal agencies and some universities. WSFD specifically participates in the Survey Component of Detection Monitoring. Wyoming's Forest Health Program Leader is the State contact for the FHM program. WSFD has conducted aerial surveys in Wyoming since 2002.

Aerial surveys have been recognized for over 50 years as an efficient and economical method of detecting and monitoring forest change events over large forested areas. This is a relatively low-cost remote sensing method that provides a coarse, landscape-level overview of forest conditions. Aerial surveys can be used as the first step of a multi-tiered process of detecting,

monitoring, and evaluating changes in forest conditions. Utilizing other remote sensing and ground sampling techniques to gather additional data on significant forest events or change observed from above adds further credibility to aerial survey results.

II. Characteristics of an Aerial Survey

Timing: The primary survey season in Wyoming typically occurs between the end of June and the middle of September. WSFD usually conducts their surveys starting in early July through August. The aerial survey is timed to capture the overlapping biological windows of insect and disease "signatures" (visible foliage discoloration). Survey days typically commence at 8:00 AM or when the sun has risen high enough as to not blind the aerial observer when looking east. Landings are usually scheduled every two to three hours for rest periods and a landing is always scheduled for lunch. Surveys are finished during mid to late afternoon or sooner if inclement weather is encountered. Special surveys outside the biological windows are occasionally conducted.

Flight Vendor: WSFD has a Memorandum of Understanding with the Wyoming Military Department, Wyoming Office of Homeland Security, and the Office of The Governor. The Wyoming Wing of the Civil Air Patrol (CAP) is the flight vendor. CAP provides a Cessna Skylane 182 airplane and pilot. WSFD pays an hourly aircraft rate, fuel, and the pilot's overnight travel expenses. Civil Air Patrol is a federally chartered corporation and the volunteer civilian auxiliary of the United States Air Force. They fulfill non-combat programs and missions for the United States Air Force.

Aircraft Speed and Altitude: Aircraft survey-speed is 90 to 100 knots and altitude above ground level is between 800 to 1000 feet.

Flight Patterns: WSFD utilizes contour or drainage and grid or parallel-line flight patterns. Surveys are flown in a contour or drainage flight pattern when the airplane follows well-defined aspects of the terrain such as river drainages or ridgelines. This pattern is flown when enough topographical relief can be seen from the air to help guide the aerial observer over the survey area. This method is not recommended in poorly defined terrain. Grid or parallel-line flying patterns are flown straight in cardinal directions in a back-and-forth pattern. This method is generally flown in flat, poorly defined terrain.

Reporting: WSFD has one Dell LATITUDE XT2 laptop computer and one Trimble GPS Pathfinder XB on permanent loan from the Forest Health Technology Enterprise Team (FHTET) in Ft. Collins, Colorado.

Cooperators and Customers: US Forest Service also conducts aerial surveys of National Forests and other federal lands in Regions 1, 2, and 4 in Wyoming. Aerial survey results are shared with private landowners and land managers, Wyoming State agencies, WSFD District Foresters, USDA Forest Service's Forest Health Management, and Forest Health Technology Enterprise Team (FHTET).

Survey Areas: WSFD surveys State, federal, tribal, and private lands annually.

Limitations: There are certain limitations as to how the data can be used considering airplane speed set at 90 to 100 knots at an altitude from 800 to 1000 feet above ground level. This gives the observer little time to recognize, classify, and record activity. Due to these circumstances,

data should only be regarded as a 'snapshot' of landscape level forest health and/or forest change condition. No two aerial observers can be expected to record the causal agent, acres, and intensity in exactly the same way over the same topographical area. A single aerial observer will undoubtedly record the same area differently if flown at two separate time frames. Differences in skill, pilot experience, and weather conditions lead to variable survey results. As with all remotely sensed data, some amount of ground surveying is required before the data can be considered reliable.

III. Personnel and Qualifications

Les Koch
Forest Health Program Leader
Wyoming State Forestry Division
Fixed-Wing Flight Manager – Special Use (US Forest Service designation)

Bill Crapser
State Forester
Wyoming State Forestry Division

2nd LT Mike Gray
Wyoming Wing Director of Operations
Civil Air Patrol - Pilot

Major George Twitchell
Assistant to the Communications Officer
Civil Air Patrol - Pilot

Colonel Bill Morton
Wyoming Wing Incident Commander
Civil Air Patrol

The Department of the Interior Office of Aircraft Services and the US Forest Service provide online Interagency Aviation Training courses applicable to aerial survey at http://iat.nifc.gov. The following online courses were successfully completed by WSFD's forest health program leader:

►A-100: Basic Aviation Safety
►A-104: Overview of Aircraft Capabilities and Limitations
►A-109: Aviation Radio Use
►A-112: Mission Planning and Flight Request Process
►A-115: Automated Flight Following
►A-116: General Awareness and Security Training
►A-200: Mishap Review
►A-204: Aircraft Capabilities and Limitations
►A-218: Aircraft Pre-Use Inspection
►A-302: Personal Responsibility and Liability
►A-303: Human Factors in Aviation
►A-305: Risk Management II
►A-307: Aviation Policy and Regulations II
►A-310: Overview of Crew Resource Management

IV. Aircraft and Pilots

Specifications: All aircraft used for aerial detection surveys will carry an Aircraft Data Card and must be shown to WSFD personnel upon request. Aircraft must have a high wing, large windows for visibility, and adequate engine power. Suitable airplanes include Cessna models 182, 182RG, 206, 206 turbo, and 210. Other acceptable single engine aircraft include Cessna 185. Acceptable multi-engine airplanes include Partenavia models P-68B, P-68C, and P-68 Observer.

The aircraft must have an internal intercom system equipped with noise canceling headsets, fire extinguisher, first aid kit, seat belts, FM programmable radio, and a Global Positioning Unit for flight following. Light helicopters may also be used for aerial survey missions to more intensively cover a smaller area.

Federal Aviation Regulations require passengers be provided with supplemental oxygen when cabin pressure is above 15,000 feet and pilots are required to have oxygen if cabin pressure reaches 12,500 feet for 30 minutes or more. Personnel with breathing problems should notify the pilot immediately.

All pilots who conduct aerial detection surveys must have an approved and current Pilot Qualification Card and experience flying mountainous terrain at slow speeds (approximately 90 to 100 knots) and low altitudes (800 to 1000 feet). The pilot must have a sincere interest in safety and work as a team player by positioning the aircraft at the appropriate altitude, speed, and location to give the primary observer the best view.

Pilot Flight and Duty Limitations: All pilots flying WSFD personnel must adhere to the following:

- ►8 flight hours per day maximum
- ►Maximum of 14 hours on duty per day
- ►10 hours rest per day
- ►2 days off in any 14 consecutive work days
- ►Maximum 42 flight hours in any 6 day period
- ►If 36 or more flight hours are flown in a 6 day period, the pilot shall be off the following day and a new 6 day cycle begins

Employee Responsibility: All WSFD employees have the responsibility to stop any action or activity considered unsafe. Any aircraft passenger or crew member can request termination of any flight when they deem it unsafe for any reason. All WSFD personnel are expected to always use aircraft in a safe and cost-effective manner.

Night Flights: No single engine airplane or helicopter flights will be taken at night. Night is considered to be 30 minutes before official sunrise and 30 minutes after official sunset.

Reserve Fuel: All day flights require a minimum 30 minute reserve fuel on board upon landing. WSFD personnel should strive to land with 60 minute reserve fuel whenever possible. Fuel gauges and hourly fuel consumption are estimates and need to be regarded with caution.

Flight Hazard Maps: Aerial observers and their pilots must review flight hazard maps to insure awareness of potential hazards including temporary flight restrictions (TFR), military training routes, military operations areas, helicopter logging, fire suppression activities, radio towers,

and high suspended power-lines. Observers will obtain current TFR information from the interagency dispatch center prior to each days flight and avoid these areas during the flight.

V. Communications

Scheduling: WSFD will schedule missions with the CAP and notify the WSFD Fire Duty Officer. Prior to the initial flight, WSFD's Forest Health Program Leader will place the survey schedule on the WSFDs website at http://wsfd.wyo.gov. The online schedule will include the dates and locations.

Notifications: Each County Sheriff and Interagency Dispatch Center at the survey location will be notified. Other information relayed includes the times and dates of the survey as well as the make, model, and color of the aircraft.

Preflight Briefing and Post Flight Debriefing: The pilot and aerial observer must conduct a safety briefing prior to take-off to ensure there is a collective understanding of the mission. The pilot and aerial observer must also take into consideration the passengers on the flight. The aerial observer should also review a map of the flight area with the pilot and discuss the intended flight route and aerial survey pattern.

Crew members and pilot should engage in a post-flight debriefing.

Pilot Briefing: The pilot must brief all passengers prior to take-off and include the following:

- ▶No smoking
- ▶Placement of seat backs
- ▶Operation of doors
- ▶Supplemental oxygen
- ▶Location of survival kit
- ▶Use of seat belts
- ▶Location of emergency exits
- ▶Location of fire extinguisher
- ▶Shut-off procedures for battery and fuel

Flight Following: WSFD will engage Automated Flight Following (AFF) with tracking sent every ten minutes sending a position description (latitude and longitude) to the Wyoming Military Department Joint Operations Center (JOC). Flight personnel and JOC will utilize Wyoming State Radio System (WYOLINK) and one Wyoming Military Department talk group (WYMD3) to communicate during flights. Interagency Fire Dispatch Centers will be invited to track flight lines and will further be directed to contact JOC to relay information to flight personnel.

A flight plan may be filed with the Federal Aviation Administration for long ferry flights (point to point).

All WSFD aerial survey flights will be conducted with a programmable FM radio on board the aircraft. The radios will have an external antenna and power source and jack for headphones. WSFD aerial observers are responsible for knowing the appropriate radio frequencies and tones for the areas being surveyed.

Wildland Fire Reporting: The WSFD Forest Health Program Leader will report all observable wildland forest fires to the nearest interagency dispatch center. Observers will be especially vigilant for other aircraft and notify the dispatch center prior to entering the Fire Traffic Area (FTA). The FTA initial communication zone is defined as 12 nautical miles from the fire. If communication is not established with the dispatch center, WSFD flights will hold seven nautical

miles from the fire until communication is established and clearance is given to proceed closer. In addition, dispatch center personnel and WSFD Fire Management may request assistance from aerial observers to identify coordinates and provide other information on the fire and fuels situation of reported fires.

VI. General Flying Concerns

Conducting aerial surveys in mountainous terrain requires special knowledge, experience, and special techniques to reduce the inherent risk of such operations. Rugged terrain, mountain winds, and lack of suitable landing areas in the event of an emergency are potential hazards. Several safety factors must be considered on a regular basis.

►Ensure the aircraft has adequate power for the altitude and terrain to be surveyed.
►Density altitude can drastically reduce aircraft performance capabilities. Familiarity with density altitude factors such as temperature, weight, and altitude is important.
►Mountains and uneven terrain and approaching weather fronts cause normal winds to become very turbulent. Be familiar with wind speed, wind direction, the effect of terrain interference, and other weather conditions.
►Fatigue is an important consideration for both pilot and observers. The observer should be sensitive to the pilot's comfort and performance.
►All personnel on board will watch out for other aircraft, birds, and other hazards.
►The aerial observer is constantly challenged to position the airplane low enough to detect signatures of forest pests yet high enough to conduct a safe survey. Varying terrain such as ridges and deep canyons while maintaining a suitable safe altitude above ground level deserves special consideration during aerial survey missions.
►Hearing protection is an important consideration. Noise canceling headsets are highly recommended for all survey flights and ear plugs are recommended if a headset is not worn.
►Weather changes and mechanical problems can cause schedule changes and unplanned landings. Adequate personal gear such as extra clothing, rain gear, water, food, and personal necessities must be carried at all times. A minimum survival kit is required in each aircraft.
►The primary observer and passengers will observe the Sterile Cockpit rule: no talking to the pilot and crew members or on the radio within five minutes of the airport after take-off or before landing. All on board personnel must be aware of when the pilot is communicating.

Aerial Observer List: Following are actions taken prior to and during flight for aerial observers and suggested items to carry on board the aircraft during the survey: thoughtful and considerate attitude and behavior, dark colored shirt to prevent reflection, noise-canceling headsets, dispatch telephone numbers and radio frequencies, attribute code list, cell phone, sturdy shoes, motion sickness bags, overnight bag with personal items, sunglasses, lunch, maps, pencils, erasers, pens, notebook, jacket, camera, drinking water, handheld GPS, watch, and survival kit. Minimum contents for survival kit include knife, signal mirror, signal flares, space blanket, water, candles, two-day food supply, handheld radio, collapsible water bag, whistle, water purification tablets, waterproof matches and/or a fire starter kit.

VII. Aircraft Payment Procedures

CAP submits a Payment/Reimbursement Document for Aviation/Automotive/Miscellaneous Expenses (CAPF 108 (E), MAR 03) to WSFD when aerial missions are completed. This form lists the dates of the aerial survey, number of hours flown, hourly rate charged for the survey, and fuel and oil fees. WSFD utilizes federal funds from Forest Health Management –

Monitoring and Groundtruthing to pay CAP.

VIII. Aviation Safety Communique

An incident is an occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of the operation. Any incident should be reported in a timely manner in the form of an interagency SAFECOM. This is present at www.safecom.gov – a joint website authored by the US Forest Service and the Department of the Interior's Office of Aircraft Services. File a SAFECOM to report any condition, observance, act, maintenance problem, or circumstance which has potential to cause an aviation-related accident. Anyone can refuse or curtail a flight when an unsafe condition may exist. Never let undue pressure (expressed or implied) influence your judgment or decisions.

IX. Risk Management

Risk assessment is an analysis of physical hazards and operational procedures to arrive at a GO/NO-GO decision. Risk assessments support informed GO/NO-GO decisions which are the responsibility of management. The pilot retains the final authority for a NO-GO decision when safe operation of the aircraft is a factor. WSFD will re-evaluate any elements in which a NO answer is derived.

The following is designed to provide the aircraft user or manager a checklist to determine a GO/NO-GO decision.

YES	NO	GO/NO-GO CHECKLIST
		Aircraft data card checked – mission approved
		Pilot qualification card checked – mission approved
		Pilot flight/duty limitations checked
		Manifest completed and left at departure point
		Weight and balance completed by pilot
		Mission approved by management
		Pilot briefed by personnel on intended mission and hazards
		Aircraft safety briefing provided to passengers
		Personnel trained and qualified for mission
		Flight plan completed and flight following established and operational
		Hazard map reviewed for low-level flights
		Weather forecast received and winds are within prescribed limits
		Cargo checked and secured
		Survival equipment available if required

A matrix for Operational Risk Management developed by the US Forest Service assesses the risk of an aerial survey. WSFD will use this matrix prior to each flight by circling the risk number that corresponds to their situation. Aerial survey flights will be canceled if extreme risk is scored but will proceed if low and moderate risk is encountered. Flights will proceed if factors can be mitigated to reduce a high risk score otherwise, the flights will be canceled.

Pilot Rest (select 1)	
Pilot has had no day off within last 7 days	1
Pilot has had no day off within last 10 days	3
Pilot has had no day off within last 12 days	5
Subtotal	
PILOT QUALIFICATIONS (select 1)	
Pilot has > 2000 hrs experience in this mission	1
Pilot has 1000 to 2000 hrs in this mission	2
Pilot has 500 to 1000 hrs in this mission	4
Pilot has < 500 hrs experience in this mission	7
Subtotal	
PILOT CURRENCY (select 1)	
Pilot has flown this mission w/in the last 15 days	1
Pilot has flown this mission w/in the last 30 days	2
Pilot has flown this mission w/in the last 60 days	3
Pilot last flew this mission over 60 days ago	4
Subtotal	
MISSION (select all that apply)	
Flight can be conducted above 1000 feet AGL	1
Flight below 1000 feet AGL required	4
Area to be surveyed is within a MOA	2
Area to be surveyed crosses 1 or more MTR's	3
Density altitude expected to exceed 8,000 feet	2
Density altitude expected to exceed 10,000 feet	3
Density altitude expected to exceed 12,000 feet	4
Survey area unfamiliar to pilot	3
Subtotal	
TERRAIN (select 1)	
Flat to rolling terrain below 7000 feet MSL	1
Rough terrain (mountains < 7000 feet MSL)	3
Mountainous (mountains > 7000 feet MSL)	4
Subtotal	

URGENCY (select 1)	
Route mission – at next opportunity	0
Needed ASAP – essential for work	2
Urgent	3
Life and death situation	5
Subtotal	
WEATHER (select all that apply)	
Winds in excess of 25 knots	1
Moderate or greater turbulence	3
Rain/snow showers in forecast	4
Ground fog	2
Thunderstorms	2
Subtotal	
VISIBILITY (select 1)	
Visibility > 10 miles	0
Visibility > 3 miles but < 10 miles	1
Visibility > 1 mile but < 3 miles	3
Visibility > ½ mile but < 1 mile	5
Visibility < ½ mile	7
Subtotal	
CUMULATIVE SCORE	
Low risk	0-15
Moderate risk	16-30
High risk	31-45
Extreme risk	46+

X. Rescue Operations

In the event WSFD survey aircraft is determined overdue, JOC will follow their own protocols for overdue aircraft and search and rescue operations. Generally, after 30 minutes have expired and no contact with the aircraft and all reasonable efforts have been made to re-establish contact or determine the location of the aircraft, JOC will initiate an aircraft search. WSFD

understands that these efforts are very time consuming and expensive. ***Every effort will be made by the aerial observer to ensure no aircraft searches are unnecessarily initiated.***

XI. Emergency Contacts

Colonel Bill Morton
Wyoming Wing Incident Commander
Civil Air Patrol
307-631-3145

Wyoming Military Department Joint Operations Center
307-772-5112

Wyoming State Forestry Division
Headquarters Office - Cheyenne
307-777-7586

Wyoming State Forestry Division Fire Duty Officer (in-house)